

### **UNIT III: SYSTEM INTERACTION**

The previous unit dealt with controlling the vehicle without regard to its surroundings. This unit describes procedures and principles for coping with the requirements placed upon the driver by the demands of the Highway Transportation System, including the road, other vehicles, and natural environment. The unit consists of the following sections:

- Driving Processes
- Rules of the Road
- Seeing
- Communicating
- Managing Speed
- Managing Space

#### **INSTRUCTIONAL OBJECTIVES**

##### **Knowledge Objectives**

Students will know:

##### **SIPDE**

1. The five human functions that make up the driving process

##### **Rules of the Road**

1. The meaning of traffic signs, signals and pavement markings
2. Why signs, signals and pavement markings are located where they are and how drivers can use them as guides for assessing level of risk
3. The laws governing right-of-way
4. The speed laws

##### **Seeing**

1. The need to gather information from all around the vehicle
2. Proper seeing techniques
3. That all vehicles impose a blind spot
4. Specific driver tasks and situations where special seeing techniques are needed for safe and efficient driving
5. General factors limiting drivers capability to gather information

##### **Communicating**

1. The legal requirements for signalling
2. How to signal
3. The need to signal all turns, lane changes, and sudden slow downs
4. The safety purposes of signalling

### Speed Management

1. That speed limits must be different for different roadways and areas
2. The safety and fuel conservation benefits of effective speed management
3. That vehicles have an efficient speed range of operation
4. How speed adjustments (accelerating, decelerating, braking) affects fuel economy
5. The general relation between speed and stopping distance
6. The need to drive more slowly under certain conditions (e.g., poor visibility).
7. The major disadvantages (legal penalties, vehicle wear, fuel consumption) of excess speed

### Space Management

1. The need to maintain space around the vehicle
2. Specific rules for achieving a safe distance from other vehicles
3. The minimum space (gap) needed to avoid collision, in specific driving situations
4. Conditions when extra space is needed to drive safely
5. Techniques (e.g., minimize, separate, compromise) for reducing conflict when space is limited.

### Attitude Objectives

Students will accept that:

1. Traffic controls serve to expedite the safe, efficient flow of traffic
2. Speed limits are established on the basis of many environmental and engineering factors which are beyond the driver's control to overcome
3. Visual obstructions inside or outside the vehicle present a "clear" danger
4. The risks associated with excess speed are not worth the meager amounts of time that may be saved by driving too fast
5. Maintaining open space all around the vehicle is the only way to avoid crashes
6. Communicating the intent to change speed or position is essential to reducing risks.

Classroom discussion of speed management is strongly suggested, as this teaching method is best-suited to help students embrace desired beliefs in this area. The discussion should encourage students to reveal common rationales for speeding (e.g., it saves a lot of time, everyone else does it) and force them to examine rigorously the truth of these assertions.

Problem solving also is recommended for liberal use—e.g., visuals showing different types of roads and asking students to play traffic engineer (identify roadway/environmental factors that they would consider in establishing speed limits, warning signs, pavement markings); diagrams posing right-of-way conflicts; visuals showing blocked view situations, space limitations and "hidden hazards" (such as wheel of parked car ready to enter lane). All problem-solving exercises should require students to (1) identify the problems, (2) identify all possible ways to compensate for the problems and (3) describe the procedures for executing the optimal response.

Visuals may also aid in presentation of information, especially in covering content on: signs, signals and markings; blind spots; 2-second following distance; stopping distance; and exiting/entering freeways.

Appropriate home study assignments in the Iowa Driver Manual include the section on "Road and Highway Markings," parts of the "Driving Tips" section (Blind Spots, Following Another Vehicle, Passing, Speed, Right of Way, Interstate Driving) and parts of the "Other Vehicles" section (Motorcycles, Bicycles, Pedestrians, Mopeds).

## DRIVING PROCESSES

The processes involved in driving have been frequently conceptualized by driver educators as follows:

Search -- visually searching the environment in order to be in a position to sense and perceive important highway, traffic and environmental conditions.

Identification -- identifying those aspects of the highway, traffic and environment to which it will be necessary to respond.

Prediction -- anticipating changes in highway, traffic and environmental conditions in relation to the motion of the vehicle.

Decision -- selecting a response appropriate to the anticipated changes and conditions.

Execution -- carrying out the selected response through control of the vehicle's speed and/or direction.

Among experienced drivers, these processes are carried out largely in a subconscious, reflex basis. Except when attempting to find unfamiliar destinations, their driving responses are carried out with little or no conscious attention. This is evident in their ability to carry on conversations while handling routine driving situations. Even when an unusual circumstance arises, drivers have typically initiated the "execution" of an appropriate response before they become fully aware of the situation to which they've responded.

While the SIPDE process is not a truly accurate description of the behaviors taking place in normal driving, it is a useful aid to learning. Having students verbalize each step in the process helps them integrate the classroom learning into the actual driving and aids instructors in identifying the strengths and weaknesses of students.

The various procedures and principles involved in safe system interaction cut across the SIPDE processes. For example, good speed management involves effective search, identification, prediction, decision, and execution. Each topic addressed in this section will aid drivers in carrying out the SIPDE process more effectively such that when they become internalized to the point where they are carried out subconsciously, they will be processes that will lead to safe vehicle operation.

## RULES OF THE ROAD

As noted in the first class session, the transportation system has grown increasingly complex over the years.

To bring some order and safety to this potentially chaotic system, governments have created rules of the road to tell drivers what they must do to keep the risk of crashes to an acceptably low level.

- Ignoring these rules increases the level of risk for all road users
- Drivers who operate in this fashion risk getting tickets as well as having accidents.

## How Rules of the Road Are Set

Rules of the road have been established so that the highway transportation system can fulfill its goal: to allow the largest number of people and goods to get to their destinations as quickly and safely as possible.

Decisions about which laws will prevail (e.g., appropriate speed limit, appropriate speed limit for certain stretch of road), are made by transportation professionals who consider not only driver capabilities but also other system factors beyond the control of drivers. The factors include:

- Roadway characteristics (lane widths, visual obstructions, degree of traction provided by paving materials, roadway configuration)
- Vehicle characteristics (the types of vehicles using the roadway and the normal speed and volume of those vehicles).
- Accident experience in relation to specific locations.

To operate safely in the highway transportation system, drivers must know the rules of the road and obey them.

## Traffic Control Devices

Highway engineers use traffic control devices--signs, signals and pavement markings--to channel traffic flow and control vehicle speed and direction. If every vehicle on the roads moved in the same direction at the same speed, there could be no accidents. Under those conditions, there would always be space between vehicles. When there is space between vehicles, no crash occurs.

- This ideal condition cannot exist, because not everyone wants to go to the same place at the same time.
- Every time cars go in different directions or at different speeds, the potential for conflict (reduction of space between vehicles, collisions) exists.
- Traffic control devices are traffic engineers' way of alerting drivers to conditions which increase the normal potential for conflict and tell them how to operate to reduce the level of conflict.

## Signs

Drivers can make use of three kinds of signs:

- Regulatory signs--such as stop signs, yield signs and speed limit signs
- Warning signs--such as curve ahead or slippery when wet
- Guide signs--such as highway exit signs

Regulatory signs indicate that a certain driver behavior is mandatory to assure reasonable safety. Drivers who disregard these signs threaten the safety of others and, consequently, leave themselves open to arrest.

Warning signs alert drivers to the existence of a potential hazard ahead.

- These signs do not prescribe the behavior the driver must adopt to keep risks acceptably low. That decision is left to the driver.
- However, if an accident occurs--if, for example, driver fails to slow sufficiently before entering a sharp curve--the driver is legally responsible for the crash.

Guide signs help drivers find essential services (such as hospitals, shelter and food) or popular recreation sites (such as parks, picnic areas, airports and athletic arenas).

### Shapes of Signs [Visual 1 (Signs) may be used here]

Because traffic signs are read by people moving, often at high speeds, certain shapes are reserved for specific types of signs. The use of special shapes allow drivers to "read" at least part of the message before getting close enough to actually make out the legend on the sign. The most important sign shapes are:

- Octagon--used only for stop sign. Drivers must come to complete stop at this sign (before front end of vehicle crosses plane of sign). Driver must let cross traffic (vehicular or pedestrian) pass before entering or crossing intersection controlled by stop sign.
- Equilateral Triangle--reserved solely for yield sign. Driver must slow--stop if necessary--and let cross traffic pass before proceeding.
- Pennant--used only to designate no passing zone. NOTE: this sign appears on the left side of the street.
- Diamond--a warning sign, that alerts drivers to special road hazards ahead.
- Rectangle--when vertical, is a regulatory sign, telling drivers what they can or cannot do. When horizontal, serves as a guide sign giving drivers directions to services or popular locations.
- Pentagon (house shaped)--reserved for signs warning about the likely presence of children on or near the road. Used at school crossings, near schools, playgrounds and other areas where many children gather.
- Crossbuck--reserved for railroad crossings. A number sign under the crossbuck tells how many sets of train tracks are at the crossing.
- Circle--a warning sign alerting driver to the presence of a railroad grade crossing ahead.

### Colors of Signs

The colors on a sign also inform drivers about the expected behavior or type of information ahead:

Red -- means stop.

- The stop sign is completely red
- The yield sign (equilateral triangle) is bordered in red to indicate the likelihood that driver will have to stop before proceeding.
- Red also is used on regulatory signs to indicate that a specific driving maneuver (e.g., left turn) is prohibited (red circle with red slash running from 11 o'clock to 5 o'clock over forbidden action).

Yellow -- the color of a warning or caution sign. Used on diamonds, pennants (no passing), pentagons (school crossing) and circles (railroad crossing)

Orange -- construction and maintenance warnings, indicating that workers may be on or near the road

White -- on regulatory signs (rectangles and crossbucks) telling drivers what to do

Green -- used on directional signs such as highway exit signs, telling drivers where a place is located and how far away it is

Blue -- indicates services ahead for drivers (e.g., hospitals, hotels, gas stations, restaurants, camp grounds)

Brown -- used on guide signs pointing to historic sites, parks or recreation areas

## Message

In addition to shapes and colors, signs also bear messages.

- The message on a sign gives more information about what the sign is trying to tell drivers.
- Some messages take the form of pictures for drivers who can't read English

## **Traffic Signals**

### Traffic Light

The basic traffic light (or "semaphore") has three colored lamps: red on top, amber in middle, green on bottom.

- Lamps light in a standard sequence: red, then green, then amber.

Intersections controlled by traffic lights are much busier than intersections governed only by signs.

- Engineers try to use the least restrictive traffic control device possible, consistent with an acceptable level of safety. They don't want traffic to be tied up any longer than is absolutely necessary.
- Engineers will tighten the control at an intersection only after experience--in the form of numerous accidents--shows that the existing control is insufficient to keep drivers from having too many accidents. Hence, the very type of control device at an intersection gives drivers an indication of the level of risk present.
- Traffic on the cross street of an intersection controlled by a stop sign is normally heavier than that on a cross street of an intersection controlled by a yield sign. Similarly, traffic on an intersection controlled by a traffic light will be heavier than that on an intersection controlled by stop signs.

### Red Light

Red means stop:

- Drivers must come to a complete stop at the designated location ("stop here" regulatory sign, stop line, cross walk).
- If there is no designated stop point, driver must stop vehicle before front bumper reaches intersection.
- Driver must remain stopped until light turns green. The only exception is when the driver wants to make a right turn, and there is no sign specifically prohibiting a right turn on red.

A right turn on a red light can be more dangerous than a right turn at a stop sign since other road users may not expect the vehicle to move. When making a right turn on a red light:

1. Come to a full stop
2. Check all lanes on the cross street to the left
3. Check the sidewalks and allow pedestrians to clear the crosswalk before starting turn.

### Green Light

The green light means drivers can proceed into the intersection when the coast is clear.

- Most dangerous time to enter an intersection is just as soon as the light has turned to green.

- Cars on the cross street may have misjudged the light or may try to "beat the yellow." May enter the intersection as the light changes or shortly thereafter.
- Driver should always check to make sure the way is clear before entering an intersection on a green light.

### Amber Light

The amber light warns drivers that the signal is about to change to a red light.

- It tells drivers to prepare to stop for the red in a controlled fashion.
- In fact it is illegal to enter an intersection after the light has turned amber.

### Flashing Lights

Some intersections are controlled by flashing lights. Traffic on one road will have a flashing red while traffic on the cross street will have a flashing yellow.

- The flashing yellow tells drivers to slow down and be prepared to stop for traffic entering the intersection.
- The flashing red tells drivers to come to a complete stop, like for a stop sign.

### Lighted Arrows [Visual 2 (Lighted Arrows) may be used here.]

Sometimes traffic lights present drivers with colored arrows rather than circles.

A green arrow permits drivers to turn in the direction in which it is pointing

- If a green arrow is appearing, traffic coming the other way will be stopped. Unless otherwise noted, drivers can turn with the arrow and be protected.
- It's a good idea to check and see what oncoming traffic is doing before starting the turn.
- When a green arrow goes out, leaving only a solid green light, a turn is not protected.

A yellow arrow, whether solid or flashing, tells drivers to proceed with caution in the direction in which it is pointing. Drivers should be ready to stop as they approach it. In most cases, it will soon change to red.

A red arrow prevents drivers from turning in the direction the arrow is pointing until the arrow goes out.

### Lane Control Signal

Signals that present drivers with X's and arrows pointing down control the use of lanes. They are used on roads in which traffic can move in one direction on a given lane some of the time, and at the opposite direction at other times. These signals are usually found where traffic changes direction at different times of day (rush hours, for instance). Each lane will carry its own signal.

- A red X indicates the lane underneath is not open to traffic driving in the direction the driver is going. Never drive in a lane under a red X.
- A green arrow pointing down indicates that drivers can drive in that direction in that lane.
- A yellow X tells drivers to move out of the lane beneath it because a red X is coming up.
- A flashing yellow X means that the lane can be used only to make left turns. Drivers should enter these lanes with caution and only a little distance before reaching the intersection at which they will turn.

## Pavement Markings

Pavement markings show drivers the paths they must maintain to avoid conflicts with other vehicles. The markings also warn drivers when certain maneuvers are unsafe.

### Lane Delineators

- Yellow lines usually separate lanes of traffic that move in opposite directions. In almost every case, these lines should be on the driver's left.
- White lines usually mark off lanes of travel going in the same direction. Often roads have a white line along the right hand edge, telling drivers where the road ends and the shoulder begins.
- Solid lines indicate it is illegal to cross in order to pass another vehicle. Solid lines may be crossed only to turn into an alley or a driveway
- A broken line can be crossed in order to pass

### Stop Lines and Crosswalks

White lines running across a roadway indicate where drivers must stop to avoid conflicts with cross traffic.

A single white line running across the driver's lane indicates the legal stopping point for a stop sign or stop signal.

Parallel White Lines running across the roadway mark out pedestrian crossing areas.

- Drivers may not stop with any part of the vehicle extending into a pedestrian crosswalk.
- As crosswalks are usually marked only where there is heavy pedestrian traffic, drivers should be especially alert to the presence of people traveling on foot.

Reversible Lane Markings [Visual 3 (Lane Markings) may be used here.]

Double yellow broken lines mark "reversible" lanes.

- These lines mean that traffic changes direction on this street at different times of the day.
- Drivers on streets with these double dashed lines should check along the side of the road or overhead for signs and signals that explain what lanes they can travel in safely.
- While looking for signs or signals, stay in far right lane where least likely to meet oncoming traffic.

Shared Left-Turn Lanes [Visual 4 (Shared Left-turn Lane) may be used here.]

A shared left turn lane will sometimes be designated between two lanes of traffic moving in opposite directions.

- They are marked by double lines: the outside lines are solid, the inside lines are broken
- Between these lines are arrows curving in opposite directions. Arrows indicating a left turn are alternated with arrows curving toward and to the right of the driver (indicating left turn for oncoming traffic).
- These markings typically occur on roads that were once narrow but later widened because of roadside development. They are fairly common around shopping centers.



Sharing a left turn lane can be dangerous. To handle the situation safely:

1. Be sure not to get into the lane too soon. The longer drivers are driving in the center lane, the more likely they are to meet someone coming the other way.
2. Be quick. Drivers should give themselves just enough time to enter the shared lane, straighten the car, signal the turn and, if they must, stop before making turn.
3. Watch for cars on side roads. They may want to cut across the driver's path to reach the other side of the street.
4. Do not use the center lane for passing. It is for turning traffic only.

### Restricted Lanes

A series of diamonds marks a lane where certain vehicles are allowed to travel at certain times of the day (often during rush hour).

- It may be restricted to buses, bicyclists, people turning right at the next corner, car pools, etc.
- Drivers should look for a sign on the side of the road or overhead for details.
- If drivers are in a vehicle that does not qualify for the diamond lane, they must stay out of it.
- Driving in a diamond lane with an "unqualified" vehicle can result in a ticket.

### Right Of Way

The legal concept of "right of way" is designed to resolve traffic conflicts that might otherwise result in a driver encroaching on the space another driver needs to maintain around his vehicle.

### Meaning of "Right-of-Way"

- The law grants right of way to no one; it does, however, state who must yield the right of way.
- No one can insist on taking the right of way, because the law grants right of way to no one.
- The law states that a driver has failed to yield right of way whenever the driver enters a lane of traffic in such a way as to make another either change speed (e.g., slow down) or direction (change lanes) to make room.
- Where traffic controls such as stop lights, stop signs and yield signs are present, the driver facing these signs or signals has no right of way decisions to make. These devices are telling the driver to stop or slow to yield the right of way.

### Right of Way Rules

Where signal control devices are not present, general laws of right of way provide guidance as to which drivers must yield.

- At four-way or three-way stop signs, a driver reaching a stop sign after a driver on the cross street has reached his sign must yield to the driver who got there first.
- Drivers turning left must yield to oncoming cars going straight ahead.
- A driver approaching the cross street of a T-intersection must yield to drivers on the cross street.

- Traffic on a minor artery wishing to merge onto a major artery (e.g., entering freeway from ramp) must yield to traffic on the major artery.
- On two equal roads, drivers coming from the left must yield to cars coming at the same time from the right.

If drivers are unsure, eye contact can be helpful. However, eye contact is not foolproof, both drivers could end up pulling out at the same time.

## Speed Laws

### Speed Limit Signs

Regulatory speed signs tell drivers how fast they can go safely under ideal conditions. Engineers determine this maximum safe speed taking into account factors such as traction available from paving surface, lane width, visibility, density and normal speeds of other traffic, presence of intersections, merging locations.

Advisory speed signs tell drivers how fast they can go along certain sections of the road and still handle permanent hazards safely. Advisory speed signs are usually found beneath the yellow warning signs (e.g., curve ahead).

In less than ideal conditions, such as when bad weather leaves the roads slippery or reduces visibility, drivers should drop speed below both posted and advisory limits.

### General Speed Limits

Not all roads are posted with speed limits. It is simply not economically possible for the State to put up speed signs along every road and at every block. When drivers find themselves without posted limits, the following speeds are the legal maximums:

- In business districts -- 20 mph
- In residential or school districts -- 25 mph
- On secondary and primary roads -- 55 mph
- On interstate highways -- 65 mph
- On all other types of roads and locations -- 45 mph

### Basis of Speed Limits

Limits reflect the driving environment normally provided by each type of location and roadway.

- Business districts typically have heavy traffic flow, many pedestrians, and numerous intersections. They offer almost unlimited opportunities for traffic conflicts. Drivers need to be going relatively slowly to identify hazardous situations and respond to them safely in the close quarters of city (business) roadways.
- As the likelihood of encountering dense traffic, frequent intersections, and the like decreases (moving from business districts to residential areas to rural locations), the prevailing speed limits are relaxed.
- Speed limits are at their highest on controlled access highways, where fewer opportunities for speed change (e.g., traffic lights) or directional conflict (e.g., intersections) exist and where the environment is more forgiving or driver-friendly (e.g., wider lanes, road shoulders, more gradual hills and curves, greater lines of sight).

### Minimum Limits

Interstates and some other high speed roadways also may be posted for a minimum speed limit.

- Drivers may be ticketed for driving below the allowable minimum.
- The idea of minimum speed limit is to assure that all traffic will be moving within a fairly narrow range of speed (if vehicles traveling in the same direction are all going at the same speed, they cannot collide).
- The greater the difference in speed between two vehicles sharing a road, the higher the risk of a crash.
- The minimum on all interstates is 40 mph. Vehicles that cannot go that fast and drivers that do not feel comfortable driving that fast are not allowed on the interstate.
- Drivers should always remember that maximum safety is attained when their speed is both within the legal limit and matches that of other vehicles on the road.

### SEEING

Most of what drivers do in driving is a reaction to what they see. The more information a driver's eyes collect from moment to moment, the better the driver will be able to deal with a changing traffic scene. Studies show the biggest reason drivers have accidents is because they didn't look at the right place at the right time.

We do most of our seeing in front of us. But good drivers always shift their gaze--far ahead, directly in front of the car, from side to side, and behind--to see everything that is happening around them. To see safely, drivers must know where to look and must have a clear view of where they are looking.

### Seeing Ahead

Looking Far Enough Ahead [Visual 5 (Looking Ahead) may be used here.]

Drivers must look far enough ahead to see things early.

- Spotting and identifying a hazardous situation early allows drivers to make controlled responses and avoid panic moves which often cause accidents.
- One of the most common mistakes inexperienced drivers make is looking just in front of the car instead of far down the road.
- Expert drivers focus their eyes about 12 seconds ahead. All drivers should keep track of events occurring along the roadway as far ahead as the car will travel in 10-15 seconds.

--10 seconds equals about one city block at 25 mph

--10 seconds equals about a quarter of a mile (3 city blocks) at 55 mph

- If a driver often has to hit the brakes suddenly or make quick lane changes, it indicates that he/she is not looking far enough down the road.
- Drivers must scan the distance of the entire road ahead from right in front of the car to 10-15 seconds ahead. Keep eyes moving both near and far.

### Scanning Roadsides

Drivers should glance to the sides of the road often. Looking along the roadside for:

- Cars and people that may be entering the road by the time the driver reaches them
- Signs warning of conditions ahead
- Signs with information about places ahead and how to reach them.

### Advantages of Distance Scanning

- By looking far enough and wide enough ahead, drivers are able to see important things they may not see later (e.g., someone getting into a parked car).
- Looking far ahead gives driver time to predict what may happen and adjust (speed and position) to accommodate developing problems before they become emergencies.

### Seeing To The Sides

#### When to Look to the Sides

- Whenever nearing a place where others may cross or enter path, driver must look to the sides to make sure no one is coming.
- While people--especially children--may dart into a road at any location, the most common sites where drivers will encounter cross traffic is at intersections.
- An intersection is any place where traffic traveling in one direction meets traffic coming from another, including crosswalks, railroad crossings, the ends of driveways, shopping center entrances and freeway entrances.

[Visual 6 (Watch It) may be used here.]

#### Controlled Intersections

- When preparing to cross or enter a cross street, drivers must check traffic coming from both directions.
- This is true for all intersections, even if they are "controlled" by signals or signs.

[Visual 7 (Stop Twice) may be used here.]

- Drivers can't rely on control devices to protect them. Right of way is just an idea, not a forcefield.
- Other drivers may run red lights, jump stop signs or drive the wrong way on one way streets.

#### Uncontrolled Intersections

At uncontrolled intersections where there is no red light or stop sign that is supposed to halt traffic on the cross street, drivers must look to the sides more carefully. They should:

- First look left--the first potential source of conflict
- Then look to the right -- traffic coming from that direction may hit the driver after he or she has crossed the first lane
- Then look left again, to make sure no vehicle not seen the first time has suddenly appeared
- After checking left, right, left, the driver then can proceed into the intersection.

#### Crosswalks

- When approaching a crosswalk, scan the entire area, left and right.
- Pay special attention to the right side area, as pedestrians and bicyclists on the right will be only a few feet from the vehicle.

- When turning right just beyond a crosswalk, check for anything that might be between vehicle and the curb. Glance over right shoulder for bicyclists who may be trying to go straight through the intersection.
- Drivers should also remember that, when they are turning on a green light, pedestrians crossing the street they wish to enter have a green light too. The driver must yield right of way to pedestrians in the cross street walkway.
- Crossing pedestrians may be expected anywhere there are many people. Drivers must step up scanning activities in these locations: shopping centers, parking lots, construction areas, playgrounds, school yards, construction sites.

#### Railroad Crossing

- Drivers must look both left and right as they approach a railroad crossing, even if the warning signal is not flashing (it may be out of order).
- If drivers are waiting at a double set of tracks while one train passes, they should not start to move out as soon as the last car goes by. There may be another train on the other tracks from the other direction.
- Drivers must wait until the first train is well down the track, giving them a clear view of activity on the other set of tracks in both directions.

#### Seeing Behind

##### When to Look Behind

- While most hazards will approach from the sides or the road ahead, drivers cannot afford to ignore what is going on behind them.
- Mirrors serve as drivers "eyes" in the back of their heads.
- Mirrors should be checked often: 3-4 times a minute.
- By checking all mirrors regularly, drivers will be able to spot someone following too closely or coming up too fast.
- By identifying these hazards early, drivers will have time to respond to them safely.

##### Blind Spots [Visual 8 (Blind Spots) may be used here.]

- Though mirrors are very useful, they can't show drivers the whole picture.
- When drivers face forward, there are two blind spots in their field of view, both big enough to hide a car.

--Blind spots are the areas between what the mirror shows and what can be seen out of the corner of the eye.

--There's a blind spot on each side of the car.

- No matter what kind of mirrors a vehicle has or how much a driver stretches to the side to change the scene revealed in the mirrors, the driver still cannot get a view of what's going on in the blind spots.
- While convex (rounded up) mirrors do let drivers see into the blind spot, as well as into distant lanes, they make objects appear further away than they really are.
- Even with these mirrors, the driver must make a head check to verify the true distance between his vehicle and the vehicle in the blind spot.

### Checking Blind Spots

- The only way drivers can see what is in the blind spot is to turn their heads and look over their shoulders.
- When to Check Behind

Drivers should check their mirrors only when they are sure the path ahead is clear. Once they're sure of this, they can glance quickly into their mirrors.

- If they spot a hazard behind in the mirrors, drivers will need to monitor the situation.
- Monitoring should be done by stepping up the frequency with which they check mirrors, not by increasing the duration of their mirror checks. Drivers should never stare into the mirrors, as this will keep their eyes off problems ahead for too long).

Drivers must be sure to check behind before performing any maneuver that will frustrate other drivers' expectations:

- change lanes,
- slow down quickly, or back up.
- Must also check behind when driving down a long hill.

### Changing Lanes

Drivers must make it a habit to look over their shoulders every time they change lanes. "Changing lanes" applies to:

- moving from one lane to another on a roadway
- entering a freeway or highway from an entrance lane
- leaving a freeway or highway via an exit lane
- entering the roadway from the curb or shoulder

In performing these lane changes, drivers must:

1. Use both the rearview mirror and the mirror on the side of the lane into which they will be moving. Rearview mirror check may reveal a driver coming up quickly who will want to pass by, entering the same lane the driver wants to enter.
2. Turn head and glance over the shoulder in the direction they will be moving, to get a view of the blind spot on that side.
3. Be sure to look fast. Drivers can't afford to keep their eyes off the road in front for more than an instant. (The car ahead could stop suddenly.)
4. Remember to check the far lanes. On a highway with several lanes, someone in another lane may plan to move into the same space the driver wants to occupy.

### Slowing Down Suddenly

Drivers must always check behind before slowing down quickly:

- Slowing down for something in the road ahead that a driver behind can't see. For example, a driver may come around a corner and find a car stalled in the road. A following driver may not be able to see the stalled car.

- Getting ready to turn into a side road or driveway. Even if a driver signals a turn and starts to slow, a following driver may interpret that as the intent to turn at the next major intersection.
- Beginning a maneuver to pull into a parking space. Again, the following driver may misinterpret the intent as being to turn into an intersection further down the road.

### Backing Up

- Backing up is dangerous because it's hard for drivers to see behind their cars. This is why drivers should always walk behind their cars, checking for children or objects hard to see from the driver's seat, before getting into a vehicle to back it up.
- Because no combination of mirrors gives drivers a full view of what's behind, they must turn their bodies and look directly through the rear window whenever they back up.

### Driving Down Long/Steep Hills

- Trucks and buses will often build up speed on a downgrade.
- By stepping up their mirror checks on a downgrade, drivers will be able to spot these vehicles early and react appropriately.

### Ability to See

- A variety of factors can limit a driver's ability to see everything that must be seen to drive safely.
- This is critical because 80% of all information drivers need to operate safely must be gathered by the eye.
- The only physical test administered in the licensing exam is a vision test, (hearing, reflexes and other physical abilities are far less important to safe driving).

### Practices that Improve the Ability to See

- Clear snow, ice or frost from all windows before starting to drive
- Do not hang things from the mirror or place unnecessary decals on windows (Besides blocking vision, they are illegal.)
- Store all objects in the vehicle in low, secure locations--not on the dashboard, rear window ledge or from hangers.
- Make sure that top loads are arranged so they don't hang down to block the driver's view
- Do not travel with the trunk or hatch up. (Leaves driver blind to what's going on behind and lets harmful exhaust fumes into the car.)

## **COMMUNICATING**

To share the road safely with others, drivers must know how to send messages to other drivers and how to interpret sometimes obscure messages sent by others.

Drivers must communicate their intention to change speed or direction. However, such messages cannot be received, if the intended receiver does not know that the other driver is there. Hence, drivers must always operate in a fashion that communicates to others on the road: "I am here."

## Communicating Presence

### Positioning the Vehicle

- Keep the car where it can be seen by others. Drivers can't communicate with people who don't know where they are.
- One way to avoid not being seen is to keep out of other drivers' blind spots.
- If the front bumper is pretty close to being in line with the adjacent vehicle's back bumper, the trailing vehicle is in the other driver's blind spot.
- If the driver finds himself/herself in another's blind spot, he/she should slow slightly (drop back) or speed up (pull forward) slightly so the vehicle will remain in clear view.
- When passing another vehicle, pass through that vehicle's blind spot as quickly as possible.

### Headlights

- Whenever drivers can't see well--because of darkness, fog or other environmental conditions--they should turn on their headlights. Headlights give the message: "I am here."
- Headlights are useful on gray days when the car seems to blend into the surroundings.
- Whenever a driver has difficulty seeing other cars, it's likely that others are having trouble seeing the driver's.
- Drivers should also tell others when they are hard to see. Flashing headlights gives the message: "I almost didn't see you."
- Parking lights are inferior because:

--They don't help the driver see.

--They give a false message (that the car is parked), and other drivers may get the wrong idea about what the vehicle is doing.

They make the car look farther away than it really is. (Parking lights are dimmer and smaller. Cars on cross streets and oncoming vehicles wishing to make a left turn may see parking lights and misjudge the gaps between vehicles.)

### Horn

- The horn can also send the "I am here" message. To give this message, drivers should use only a short beep.
- A long blast gives the message: "immediate danger present." It should be used only in true emergencies. The short beep is appropriate for getting the attention of people near the road or drivers about to be passed to let them know a driver is moving in the vicinity.

Communicating Change of Direction  
Since drivers expect other vehicles to keep moving straight ahead, it is important to signal all lane changes. Lane changes include:

- Turns
- Entering or leaving parking spaces
-



- Merging
- Changing lanes

Hand Signals [Visual 9 (Hand Signals) may be used here.]

Drivers may use the following hand signals:

- Moving left -- left arm extended straight, horizontally
- Moving right -- upper arm extended horizontally, forearm pointed straight up, fingers extended.

Turn lights are generally better communicators than hand signals, because flashing lights draw attention better.

### When to Signal Direction Changes

The key to communicating a change in direction effectively is to give others time to read the message and react.

- Under Iowa law, drivers must signal every turn or lane change:
  - At least 100 feet before making a move at speeds under 45 mph
  - At least 300 feet before making a move at speeds of 45 mph or more
- Since it's hard to estimate these distances on the road, a good rule of thumb is to activate the turn signal at least three or four "blinks" before starting the maneuver.
  - For a turn at an intersection, start signaling about half a block away.
- If planning to turn into a driveway or alley just beyond a major intersection, the driver must be careful not to mislead others by signaling too early.
  - If driver starts signaling before reaching the intersection, others seeing vehicle go through the intersection may mistakenly assume that signal was made accidentally.
  - It is better to wait until the moment the major intersection is entered before giving signal.

### Signalling When Passing

- Since passing is inherently dangerous, it is important to let the driver about to be passed know what will happen.
- Driver should give the horn a beep (to draw attention to the turn signal) before pulling into the left lane to pass.
- Drivers should never use horn when passing on the right. Some people tend to move automatically to the right on a multi-lane road when they hear a horn behind them.

### Communicating Change of Speed

Brake lights give the message: "I am slowing down." The problem with this message is that it doesn't tell others how quickly a vehicle is slowing and whether or not it will be coming to a full stop.

The way to communicate "I will be slowing quickly" is to tap the brake pedal three or four times rapidly.

- This flashes the brake lights, attracting others' attention and warning them to expect a sudden slow or stop.
- Drivers should flash their brake lights whenever they will be slowing or stopping suddenly at a location where others might not expect it:
  - in the middle of a block: when getting ready to park or turn
  - when coming upon stalled traffic or something in the road that the driver behind can't see.

#### Communicating Breakdowns [Visual 10 (Communicating Breakdowns) may be used here.]

When drivers get a flat tire or have an engine breakdown on the road, they must communicate this fact to others immediately. When drivers encounter car trouble and must slow suddenly or stop they should:

1. Warn traffic behind -- Turn on emergency flashers. If vehicle doesn't have flashers, use turn signals on the side of the car where most traffic will travel
2. Pull off the road -- Move the car as far away from traffic as possible.
  - Get as far to the right side of the road as possible.
  - If on a wide divided highway, traveling in the left lane, the driver can pull the car over to the left if there is a wide shoulder or center strip.
  - Use the left lane only if no other choice, since traffic in the left lane is moving faster than traffic in the right lanes.
3. If the driver can't pull off the road, try to stop where people have a clear view of the vehicle from behind--not just beyond the crest of a hill or just around a curve.
4. Place emergency flares or triangles at least 200 feet behind the car--signal this far behind the vehicle to give approaching drivers time to change lanes and go around vehicle. If emergency flares or triangles are not available, use a flag, white rag or (at night) a flashlight to warn approaching drivers.
5. Be sure to stay off the roadway--Stand by the side of the road and wave traffic around the car.

#### If a disabled vehicle must be stopped just beyond a hill or a curve:

- Place emergency flares or warnings behind the car on the upstream side of the hill or curve.

If flares are not available, the driver should stand by the side of the road on the upstream side of the hill or curve.

#### MANAGING SPEED

An earlier section of this unit discussed how traffic engineers determine what is an appropriate speed limit. They consider a variety of things such as:

- Presence of dangerous curves or intersections
- Types of development
- Things happening (along the side of the road)
- How well drivers can see what's ahead

- How much and what kind of traffic is usually on the road
- How people park on the road
- How pedestrians use the area
- The number and kinds of accidents that have happened there.

Traffic engineers study roads and their actual use for a long time, getting a "big picture" of what speeds are necessary to maintain an acceptable level of safety. Speed limits, then are chosen in a very scientific way.

Posted speed limits are set for normal conditions. However, there are many conditions in which drivers must operate below the posted limit in order to be at a safe speed.

Too many drivers think that they know much more about driving and the road than the professional engineers. These drivers tend to ignore posted speed limits. As a result, are tickets and they get involved in accidents.

### **Speed And Accident Risks**

- Excess speed is involved in about one of every 6 traffic crashes.
- Not only does excess speed increase chances of having a crash, it also decreases a driver's chance of getting out of an accident alive.
- Excess speed is the primary cause of almost one third of all fatal crashes. The chances of dying in a crash double as speed increases from 55 to 65 mph.
- The chances of dying triple as speed increases from 55 to 75 mph.
- The faster a vehicle goes, the longer it will take a driver to stop safely and the more room is needed to make a quick maneuver to avoid a collision.

### **Speed and Stopping Distance**

Speed management is critical to accident avoidance because speed is the major determinant in how long--in time and feet--it will take a car to stop. The faster a car is going, the more distance a car will travel before it can stop.

Worn, wet or hot brakes and bald or underinflated tires can increase stopping distance. Extra weight (in the form of heavy loads or trailers) will also increase a vehicle's stopping distance.

### **Reaction Time**

The driver's reaction time is another factor in determining stopping distance.

- Reaction time is the time lapsed between the moment a driver identifies a hazard and the time the driver executes the response (hits the brakes). Hence, reaction time includes much more than "reflex" time.
- It includes the time the driver requires to sort through the various options for dealing with the hazard and deciding that braking is the appropriate response.
- Reaction distance is much less than half of the total stopping distance for all normal driving speeds.

### **Braking Distance**

- The bulk of the distance covered is "braking distance"--the area covered by the car once brakes have been applied.

- Drivers have little control over their vehicles' braking distance--except in terms of having controlled the speed at which they were driving when braking was initiated.
- Once brakes have been applied, it becomes strictly a matter between the brakes and the forward momentum of the vehicle.
- Young drivers feel they have better than average reflexes. The problem is reflexes do nothing to decrease braking distance, the major factor that determines where they will stop.

Relation of Speed to Stopping Distance [Visual 11 (Average Stopping Distance) may be used here.]

Because of their lack of experience, younger drivers also tend to underestimate how long it will take their vehicles to stop.

- Many believe that if they drive twice as fast, their stopping distance will be twice as long.
- Stopping distance increases geometrically, rather than arithmetically, with speed.
  - A vehicle going 40 mph instead of 20 mph needs three times as much distance to stop (150 feet instead of only 50 feet), not twice the distance.
  - The stopping distance required for a vehicle going 60 mph is four times that of a vehicle going 30 mph (360 feet versus 90 feet).

The primary rule governing safe speed selection is: drivers should not go faster than the speed at which they will be able to stop before reaching a hazardous situation ahead.

#### **Adjusting Speed To Roadway Configuration**

Drivers must also select a speed that is safe for the layout of the road.

#### **Speed in Curve**

- When driving along a straightaway and approaching a curve, the car will tend to keep going straight. The faster a car is going, the more stubborn this tendency becomes.
- The only thing fighting this tendency is the front tires. The only part of the tire in contact with the road is about the size of a human hand.
  - Between the two front tires, drivers have less than two square feet of rubber on the road to turn the entire car from its straight ahead path.
  - If going too fast for a curve, front tires will lose their grip on the road and cause the car to skid or run off the road.
- Drivers should lower speed before entering a curve.
  - It is far less safe to brake in a curve because the traction (the gripping bond between tires and pavement surface) is already under stress as the car is turning.
  - Braking while turning only increases the likelihood of a skid or worsens a skid.
- As drivers come out of curves, their feet should be on the gas not the brakes. The driving force of the tires against the road will help improve traction.

#### **Speed on Hills**

When traveling downhill, drivers must take the pull of gravity into account.

- Gravity will pull the car along faster.

- To compensate for this, drivers should begin braking sooner.

### Adjusting Speed To Visibility

Drivers must adjust speed to how well they can see.

- The rule in this regard: at any speed, the distance the driver can see ahead must be no less than the distance the driver will need to stop.
- The harder it is for a driver to see the road ahead, the slower the driver must go. If the driver's view is blocked or limited in any way--by weather conditions, roadside environment, or the road itself--the driver must adjust speed to deal with the problem.

Trees, bushes or buildings at intersections can block the driver's view of cars coming from the side. Drivers must approach a "blind" intersection slowly enough to be able to stop if a car suddenly pulls out.

Steep hills and sharp curves also limit visibility.

- Drivers must approach these hills and curves with the assumption that a hazard lies just out of sight.
- Since a driver can't know whether or not a car is stalled on the road just over the crest of the hill or just around a curve, the driver must approach the hill or curve slowly enough to be able to stop if this--or some other hazard--is present.
- In approaching a hill or curve, drivers must also check behind to determine the proximity of vehicles following them.

Cars parked along the side of the road also block driver's views.

- People may be ready to get out of a car or walk from between parked cars.
- Drivers should give parked cars plenty of room and reduce speed so that they will be able to stop quickly, should someone suddenly emerge from cover.

Darkness, rain, snow and fog also limit visibility. These will be discussed in Unit IV "Driving Environment".

### Adjusting Speed To Other Traffic

Another important influence on how fast drivers should go is how fast other vehicles on the road are moving.

- The safest and most basic rule for sharing the road with others is: blend with the speed of traffic around you.
- Drivers should not travel significantly slower or faster than others on the road.
- Wherever they are cruising, drivers should try to keep their speed even. Many accidents are caused by drivers who constantly brake and then speed up.

### Speed and Lane Use

On multiple lane highways, drivers should try to pick the lane where traffic is moving at a speed at which they feel most comfortable and which keeps them within the speed limit.

- The right lane is for slower vehicles, the left for faster-moving traffic.

- On expressways, drivers should choose the left lane for passing, the center lane for cruising and the right lane for entering or leaving.

### **Anticipating Speed Changes**

Drivers do encounter situations where they must react to slower moving traffic. The key to handling these situations safely is to adjust speed early. Drivers can keep a steady pace better by taking the right action as soon as they figure out what is happening ahead. A few examples:

#### **Large trucks and small, underpowered cars**

- If coming up behind these vehicles on a long or steep upgrade, drivers should realize that they will have to pass them.
- Drivers should move into the passing lane early to avoid closing in behind the slow-moving vehicle and getting stuck there.

#### **Vehicles slowing ahead**

- When the brake lights on the vehicle ahead come on, drivers should lighten up on the gas and warn cars behind.
- If they begin slowing by decelerating early enough, they may not have to use the brakes at all.
- If a driver waits until the last moment and slams on the brakes, all the cars behind will have to do the same. Then, all the cars will have to start up again, one by one.
- To further smooth out speed, drivers should look through the windows of the car immediately ahead, watching the brake lights of cars ahead of that vehicle. This gives the observant driver extra notice of possible slow down and provides additional time to decelerate and consider the option of passing to get around the slow down.

#### **Roadway narrows**

- A sign will usually warn drivers that a lane is about to end.
- Whether the driver is in the vanishing lane or the one into which other drivers will merge, the driver should immediately prepare to change speed--either to fit into a gap in the continuing lane or to make room for a driver seeking to leave the vanishing lane.

#### **Leaving Expressway [Visual 12 (Leaving Expressway) may be used here.]**

When leaving an expressway, the driver will have to slow down.

- Most modern expressways have a special lane (deceleration lane) for motorists needing to leave the highway.
- Drivers should never slow down while still in the regular express lane when there is a deceleration lane available. Accidents are often caused at expressway exits by drivers who slow down before reaching the deceleration lane.
- If there is no deceleration lane, it is best for drivers to slow down just as they reach the exit ramp. Even if the ramp is short or severely curved, it is not a good idea to slow down much before reaching the ramp (while still on expressway). Instead, drivers should maintain speed and then brake fairly sharply as they enter the ramp.
- If drivers miss an exit, they should continue on to the next exit, then work back to the desired exit; drivers should never attempt to back up on an expressway.

## Adjusting Speed To Save Gas

Drivers who choose their speeds wisely not only reduce risks but also save fuel. Two of the best things a driver can do to save on gas are: drive at the right speed and maintain a steady speed.

### The Right Speed

Though every car is different, most get their best mileage at speeds of 35-45 mph. In most vehicles, the faster a driver goes above 45 mph, the more fuel will be used to get to the same place.

- The 35-45 mph range provides optimum fuel efficiency for most engines because the transmission is in high gear and the engine is nearing peak torque. Speeds below that range impose a fuel penalty because
  - (1) the vehicle is in a lower gear,
  - (2) the increased rolling resistance requires more horsepower to move the vehicle.
- Speeds above the 35-45 mph range impose a fuel penalty because increased wind resistance works strongly against forward motion, requiring more horsepower to sustain speed.
- Fuel penalties are substantial.
  - Driving at 65 mph can burn up to 25% more fuel than driving at 55 mph.
  - Driving at 70 mph can burn up 40% more fuel than at 55 mph.

### A Steady Speed

No matter how fuel efficient a car's engine is naturally, the driver can get the most efficiency by maintaining a steady speed.

- Drivers who constantly change speeds by as little as 5 mph reduce mpg by 1 mile per gallon.
- Greater fluctuations in speed cost even higher fuel penalties.

### Fuel Savings

Overall, drivers who travel at their maximum-efficiency whenever it is safe to do so and consistently try to maintain steady speeds can cut their annual gas bills anywhere from 10% to 50% depending on the type of vehicle driven.

## SPACE MANAGEMENT

As long as drivers maintain empty space (distance) between their vehicles and other objects, there can be no crashes.

- A basic goal of driving, therefore, is to maintain a cushion of space all around the vehicle.
- In driving, space is time. The wider the cushion of space a driver maintains, the more time the driver has to respond to traffic developments and avoid disruption of the traffic flow -- either by changing lanes or slowing gradually.
- The more space a driver maintains, the more time the driver has to assess situations and respond with the appropriate maneuver in a controlled fashion.

- Since drivers can be hit from any direction, they must maintain a "cushion of space" in all directions: to the front, the sides and behind.

### Space Ahead

#### Following Too Closely

"Following too closely" is one of the leading causes of traffic crashes.

- Typically, such crashes occur because the driver is going too fast to stop before hitting the vehicle ahead.
- Since stopping distance increases with speed, to avoid involvement in "following too close" accidents, drivers must maintain a wider cushion of space ahead when driving at higher speeds.

#### Two-second Rule

The best way to assure adequate space ahead, at any speed, is to follow the "2-second rule." This rule works as follows:

- When the rear bumper of the car ahead passes a marker (pavement marking, signpost, tree, etc.) on or near the road, driver should start counting the seconds it takes his or her vehicle to reach that same spot.
- Driver should count: "1-second-1, 2-seconds-2."
- If driver reaches the marker before finishing the count, driver is following too closely and should slow down (drop back).

The 2-second rule is appropriate, because it takes drivers roughly 2 seconds to identify and respond to changes in speed of traffic ahead.

- The 2-second rule is also superior to the old space management technique of estimating car lengths.
- It is difficult to estimate a distance such as "8 car lengths," while everyone can count off 2 seconds.

#### Extra Following Distance

In some situations a 2-second following distance is not enough. Drivers should open up a 3- or 4-second following distance in the following situations:

##### When following motorcycles.

- Many motorcycles can stop in a shorter distance than can cars. If the cycle falls, motorcyclist can stop almost instantaneously.
- The driver will need extra distance to avoid the rider.
- The chances of a motorcyclist dropping the bike are greatest on wet or icy roads, metal surfaces such as bridge gratings or railroad tracks, and on gravel.

##### When a driver behind wants to pass.

- Driver should slow down to open up a 4-second gap.
- This helps the driver pass in two ways



--Because the driver ahead is going slower, the passing driver can get by more quickly (limiting passer's exposure to risk).

--When the passing motorist pulls back into the lane, both the passer and the driver who has been passed will have 2-second following distances available.

When following drivers whose view to the rear is blocked.

- Drivers of trucks, busses, vans or cars pulling campers or trailers cannot see behind very well.
  - They may not realize a driver is behind them and would be less likely to signal a sudden stop (flash brake lights) if it became necessary.
  - Drivers following these vehicles will need the extra space to come to a controlled stop in this situation.
- Drivers following such vehicles will not be able to see "through" them to identify developing situations further down the road.
- Dropping back to a 3-4 second distance gives them extra room to see around the solid bodied vehicles and to the sides.

When hauling a heavy load or pulling a trailer. The extra weight will increase the vehicle's stopping distance.

**Space To The Sides**

The key to maintaining space to the sides is to avoid traffic situations where other drivers may inadvertently "squeeze" in on a vehicle. Some tips for maintaining room to the sides:

1. Avoid driving alongside other cars

- The adjacent driver may "crowd" the lane.
- Vehicle will be in the adjacent driver's blind spot.
- Adjacent driver may try to change lanes and pull into vehicle.
- Driver should move ahead (speed up) or drop back (slow down).
- It is especially important to avoid driving alongside cars at freeway exits.
- A driver in the left-hand lane may suddenly pull right to make the exit or a driver in the exit lane may change his or her mind and suddenly veer left back onto roadway.

2. Give extra space to parked cars. Someone may step out of the car or from between parked cars. Or, a parked car may start to pull out suddenly.

3. Open up space between vehicle and oncoming cars.

- If possible, stay out of the lane next to the center line.
- This leaves drivers more room to avoid an oncoming car that suddenly swerves toward them.
- It is very important at intersections, where another driver could turn left without giving a signal.
- If drivers must drive in lane bordered by a center line, "cheat" somewhat toward the right side of the lane.

4. Make room for cars entering freeways. If driving in the right-most lane, and there is room in the adjacent lane, switch to the adjacent lane. Drivers also should do the same, if possible, for vehicles whose lane will end shortly.

Never try to "share" a lane with people on motorcycles, mopeds or bicycles. Two wheeled vehicles are more unstable and may wobble in lane. They need the whole width of the lane to operate safely.

### Splitting The Difference

Sometimes there will be dangers on both sides of the car. For example, there may be parked cars to the right and oncoming cars to the left.

- In these situations, the best thing to do is "split the difference." Steer a middle course between oncoming cars and parked cars.
- If one danger is greater than the other, give more room to the worse danger.
- An example: there are oncoming cars to the left of a vehicle and a child riding a bike to the right. The child is the greater danger; more likely to make a sudden (and unsafe) move and be unprotected from injury. In situations such as this, the driver should move away from the greater hazard, maintaining a narrower than usual space cushion on the side of the lesser hazard.

### Separating Hazards

When drivers face danger on both sides, they don't always have to steer between them.

- Sometimes, drivers can separate these hazards by adjusting speed.
- This will allow drivers to take the dangers one at a time.
- Example: There is only one oncoming car to the left and a child on a bike to the right. Instead of driving between the car and the bicycle, the driver can reduce speed and let the oncoming car pass, then move to the left to allow extra room to the right when passing the bicyclist.

### Space Behind

The most difficult part of space management is controlling the amount behind the vehicle. It is more difficult for drivers to control the following distance of those behind them than it is to control their own following distance.

### Keeping Space Behind

Drivers can help the motorist behind keep a safe distance by:

- Driving at a steady speed
- Not stopping or slowing suddenly without warning the driver behind (tapping brake)
- Getting out of the stream of traffic if it becomes necessary to slow down or stop.

### Dealing With Tailgaters

Drivers will often find themselves being tailgated. The impatient tailgater jeopardizes both himself and the vehicle ahead, because he has left an inadequate space cushion in which to stop.

- The first rule for handling tailgaters is: don't make the situation worse. Drivers should not flash their brake lights or turn on the tail lights to make tailgaters think they are stopping.
- When tailgaters realize they have been tricked by false light signals, they may attempt to retaliate by following even closer.
- Drivers also should not speed up, in an attempt to open space between them and the tailgater. The tailgater will usually keep pace, with the end result that the driver is still being tailgated, only at higher speeds.
- The best way to handle a tailgater is for the driver to let the tailgater pass.
  - If the driver can switch to another lane, he should do so.
  - If traveling on a 2-lane road or if traffic in adjacent lanes prevents a lane change, the driver should gradually slow the vehicle by lifting up on the gas pedal. This will make it easier for the tailgater to pass.
- If the driver can not provide an opportunity for the tailgater to pass, the best move is to pull off the road (when it safe to do so) and let the tailgater go by.

### **Sharing Space**

Drivers must learn to judge how much space they need to cross lanes of traffic, merge and exit from traffic and pass other vehicles. In making any of these moves, drivers must yield the right-of-way to other vehicles. The challenge is to find and use enough space to keep their movements from interfering with others.

### **Space To Enter**

When entering a stream of traffic at an intersection, drivers must select a gap large enough to give them time to turn and get up to speed. They will need a gap that is:

- About a half block on city streets
- The equivalent of a full block on highways

### **Space to Merge**

When merging with other traffic, drivers will need a gap of 4 seconds.

- That will give both the driver and the car behind a 2-second following distance.
- Drivers must find a 4-second gap whenever they change lanes, or enter a freeway from an entrance lane, or merge with another road.
- If drivers must cross several lanes, they should take them one at a time, filtering through traffic slowly. If drivers stop to wait until there is a 4-second gap in all lanes, they will tie up traffic and may cause collisions.

Maintaining space in a merge is a matter of having the right speed.

- Drivers entering expressways are in danger of being hit from behind by two sources. If they slow down too much on the entrance ramp, they may be rear ended by drivers who are concentrating on scanning the expressway looking for an entry gap in traffic.
- If they fail to get up to the speed of expressway traffic by the time they merge into the expressway lane, they run the risk of being rear ended by vehicles already on the expressway.

- The key to successful space management in entering expressways is to start watching expressway traffic as soon as possible.
- Drivers must begin scanning the expressway while they are on the ramp, so they will have plenty of time to find a good gap in the traffic.
- Drivers must enter the expressway at highway speed. As soon as drivers gets on the entrance ramp, he should begin to build speed so that by the time he is ready to enter the expressway he'll be going as fast as the other traffic (reducing speed conflicts). The drivers who enter traffic too slowly are setting themselves up to be rear-ended.
- To reduce potential speed conflicts, drivers must not slow down at the end of the ramp. If they must slow, they should do it before reaching the end of the ramp. That way, they'll still have space ahead to speed up before getting onto the expressway.
- If drivers do slow on the ramp, they must be sure to watch for traffic behind and tap the brake lights to warn it that the vehicle is slowing early.

Sometimes, drivers will have to slow at the end of the ramp.

- This might happen because the driver ahead on the ramp suddenly decides to stop or because someone on the freeway changes lanes and ends up in the gap the driver was planning to enter.
- In such situations, the driver must wait for a very big gap before trying to merge with the high speed traffic on the expressway. It will take the driver a great distance to build up speed that matches traffic flow.

#### Space To Cross Traffic

- When crossing through traffic, drivers must have enough room to get all the way across.
- Stopping half way across is only safe if there is a median divider large enough to "hold" the car.
- Before entering the intersection, the driver must make sure that there are no obstructions (other vehicles or people) blocking the path ahead.
- It is very dangerous to be "caught" in an intersection with traffic bearing down. This is why it is against the law to enter an intersection if the move will result in blocked traffic.

Even if drivers have a green light, they should not start across if cars block the way. The light may change before the cars can clear out.

Drivers should never assume that others will share space with them.

- Just because an approaching car has a turn signal on and is slowing down does not mean the driver will turn at the intersection. He may plan to turn just beyond the intersection, or the signal may have been left on from an earlier turn. This is particularly true of motorcycles. Signals on most motorcycles don't cancel automatically.
- Drivers must wait until others actually start to turn before moving into traffic.

## Turning Off Other High Speed Road

- As drivers expect others to continue going straight, making right or left turns on high speed roads is always dangerous.
- If a right- or left-turn only lane is available, drivers should use it. Enter this restricted lane at the place where it begins.
- As is the case with expressway exits, drivers should try to maintain the prevailing speed until they have entered the turn-only lane.

[Visual 13 (Median Protection) may be used here.]

- On divided highways where no left turn lane is available, drivers can protect their space behind by pulling their car into the median space. This is the best place to slow down or stop, while checking traffic coming the other way, as the median will "cover" the car.

## Space To Pass

Passing another vehicle is always dangerous because the passing vehicle must go through the other driver's blind spot at relatively high speed with a very narrow cushion of space to the side. Passing on a 2-lane road is one of the most dangerous maneuvers in driving. Before deciding to pass, the driver must consider:

- Oncoming cars. At highway speeds, (50-55 mph), drivers need over 1600 feet (about 1/3 mile) to pass safely. It is hard to judge the speed of oncoming cars that far away. They don't seem to be moving as fast as they really are. A car that far away generally appears to be standing still. If a driver can really see an oncoming car coming closer, it is probably too close for the driver to begin to pass at highway speeds.
- Hills and curves. To be sure that there is no oncoming traffic within a third of a mile, drivers must be able to see at least a third of a mile ahead. Any time their view is blocked by a curve or a hill, they must assume an oncoming car is just out of sight. Drivers should treat curves or hills as they would an oncoming car. This means they shouldn't start to pass if they are within a third of a mile of a hill or curve.
- Where roads cross. It's dangerous to pass where someone is likely to enter or cross the road. Such places include cross roads, railroad crossings and shopping center entrances. When passing, the driver's view people, cars, or a train is blocked by the car being passed. Also, a driver turning into the oncoming lane won't expect to find a car there moving in the opposite direction. The turning driver may not even have checked for this possibility before pulling out.
- Lane restrictions. Before passing, the driver must look ahead for road conditions and traffic that might cause other vehicles to move into the intended path. Drivers might lose their space for passing because of people or bike riders near the road, a narrow bridge, or an obstacle in the other lane (patch of ice, broken pavement, tree branch).
- Space to return. A driver should never pull out to pass unless he/she knows there is enough space to return. Pass only one car at a time. Before returning to the driving lane, a driver must be sure to leave enough room between self and the car being passed. One way to do this is to look at the passed car in the rearview mirror. When the driver can see both headlights passed, there is enough room to return to that lane.
- Signs and markings. No-passing signs and markings have already been reviewed. Iowa law requires drivers to complete their pass before reaching the beginning of a "no passing zone." Drivers who are still in the left lane when they reach a "no passing zone" are breaking the law.

### Space And Emergency Vehicles

Most drivers think the main reason the law requires drivers to pull to the right and stop when they hear a siren or see flashing lights is to clear a path for the emergency vehicle so it can get by quickly. Actually, the most important reason for this right-of-way law is that emergency vehicles travel at high speeds and, consequently, are hard to control in tight spots. Emergency vehicles need a very big cushion of space. By squeezing to the sides of the street, drivers give the emergency driver the large cushion of space needed to maneuver safely.

#### **Extra Space to Drivers Who Need It**

- Drivers need to give a wide berth to certain categories of people who constitute a danger.
- People Who Can't See

Other drivers and pedestrians whose view is blocked may enter a vehicle's path because they don't know the vehicle is there. Drivers must constantly be on the lookout for others who will have trouble seeing them, such as:

- Drivers at intersections or driveways whose view is blocked by buildings, trees or other cars
- Drivers backing out of driveways or parking spaces
- Drivers whose windows are blocked with snow, ice or loads
- Drivers of large, solid-body vehicles like vans and delivery trucks
- People with umbrellas in front of their faces or hats pulled down low
- People whose view is blocked by other traffic, parked cars, busses or other large vehicles.

When drivers spot these clues, it is best to send an "I am here" message with the horn.

#### People Who Are Distracted

- People may fail to see a driver even though he is in full view if their minds are on something else. Drivers must be on the lookout for distracted people such as:
- People making deliveries
- Construction workers
- Children, who often run into the street without looking
- People who are gathered around or passing something unusual (e.g., a disabled vehicle)
- Drivers or pedestrians who are talking to each other, tending to children, looking at maps or are otherwise preoccupied.

#### People Who May Be Confused

- People who are confused are very likely to make a sudden move without thinking--or looking. Confused people that drivers must beware of include:
- Tourists, especially at complicated intersections. (Clues to look for: out-of-state license plates, baggage on vehicle)
- Drivers who slow down for no apparent reason. For example, a driver braking on the exit lane of an expressway may have suddenly realized he doesn't want to exit and may jerk back onto the road.

- Drivers looking for a street sign or house.

### Drivers Who Are In Trouble

Drivers who make mistakes are drivers in trouble. They may be in trouble because they have been drinking or showing off. Or, they may simply be new to the road or have had some sort of equipment failure. Whatever the reason for the situation, others must get out of the way of drivers in trouble.

Drivers must watch out for:

- Others who have lost control of their cars (skidding, swerving off the road, traveling too fast on slick streets)
- Others who pass as they approach a curve or oncoming car. (The driver being passed should slow down and let the passer back into the lane.)
- Drivers who have sudden vehicle failure (e.g., flat tire).
- Others about to be forced into a driver's lane by a car, pedestrian, bicyclist, object in the road or a sudden narrowing of the road.

### Parked Cars

Drivers can't assume that parked cars will stay parked. They must keep an eye out for cars about to pull out in front of them. Clues that a car's door may fly open or the car pull out include:

- Someone in the driver's seat
- Exhaust coming from the tailpipe
- Turn signals or brake lights
- Wheels turned toward the street

### Slow Traffic

Some vehicles have trouble getting up to speed or keeping to speed. For instance:

Big trucks, cars pulling trailers and small cars often have trouble keeping up speed on long or steep hills. It also takes them longer to build up speed when entering traffic from a side road or expressway entrance ramp

Bicycles and mopeds are slow, and their drivers make unexpected moves.

Certain pedestrians are slower than others, too. Drivers must pay special attention for elderly and handicapped pedestrians.

- [A series of problem-solving visuals may be used here:
- Visual 14 (Lane Drop)
- Visual 15 (Left-Turning Car)
- Visual 16 (Expressway Merge)
- Visual 17 (Entrance/Exit Ramp)
- Visual 18 (Shopping Center)]